

## 1 ABSTRACT OF THE DISCLOSURE

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3 A hybrid rocket motor is provided with a precombustion  
4 chamber supplied with propellant from separate fuel and oxidizer  
5 sources. The propellant can be in the form of gas or liquid and  
6 injected substantially tangentially into the head end of the  
7 hybrid motor adjacent the oxidizer injector to form a propellant  
8 swirl. As the hybrid motor oxidizer is injected into the swirl,  
9 it is heated and gasified, and assumes a swirling motion which  
10 increases the oxidizer path length and thereby increases the dwell  
11 time of the oxidizer. The increased dwell time increases  
12 combustion efficiency and permits multiple restarts of the hybrid  
13 motor. The propellant may also be a combination of solid and  
14 fluid reactants. In one embodiment, the oxidizer injector is  
15 extended into the combustion chamber to form a toroidal  
16 precombustion chamber which has an annular nozzle adjacent a face  
17 of the oxidizer injector.